

## CLAIMS

- 1 1. A microphotonic device comprising:
  - 2 a membrane structure that can experience strain; and
  - 3 a waveguide element formed on said membrane structure so that when said
  - 4 membrane structure is strained, said waveguide element is tuned to a selective amount.
- 1 2. The microphotonic device of claim 1, wherein said membrane structure comprises a
- 2 sub-micron  $\text{SiO}_2$  layer.
- 1 3. The microphotonic device of claim 1, wherein said waveguide element comprises a
- 2 microring resonator.
- 1 4. The microphotonic device of claim 1, wherein said waveguide element comprises a
- 2 microracetrack resonator.
- 1 5. The microphotonic device of claim 1, wherein said waveguide element comprises a 1-
- 2 dimensional photonic crystal.
- 1 6. The microphotonic device of claim 1, wherein said waveguide element comprises a 2-
- 2 dimensional photonic crystal.
- 1 7. The microphotonic device of claim 5, wherein said 1-dimensional photonic crystal
- 2 comprises holes.
- 1 8. The microphotonic device of claim 7, wherein said selective amount comprises
- 2 approximately 1%.
- 1 9. The microphotonic device of claim 3, wherein said selective amount comprises 0.2%.

1 10. The microphotonic device of claim 1 further comprising at least one piezoelectric  
2 actuator that is coupled to said membrane so as to produce said strain.

1 11. A method of forming a microphotonic device comprising:  
2 providing a membrane structure that can experience strain; and  
3 forming a waveguide element on said membrane structure so that when said  
4 membrane structure is strained said waveguide element is tuned to a selective amount.

1 12. The method of claim 11, wherein said membrane structure comprises a sub-micron  
2 SiO<sub>2</sub> layer.

1 13. The method of claim 11, wherein said waveguide element comprises a microring  
2 resonator.

1 14. The method of claim 11, wherein said waveguide element comprises a  
2 microracetrack resonator.

1 15. The method of claim 11, wherein said waveguide element comprises a 1-dimensional  
2 photonic crystal.

1 16. The method of claim 11, wherein said waveguide element comprises a 2-dimensional  
2 photonic crystal.

1 17. The method of claim 15, wherein said 1-dimensional photonic crystal comprises  
2 holes.

1 18. The method of claim 17, wherein said selective amount comprises approximately  
2 1%.

- 1 19. The method of claim 13, wherein said selective amount comprises 0.2%.
- 1 20. The method of claim 11 further comprising providing at least one piezoelectric
- 2 actuator that is coupled to said membrane so as to produce said strain.